

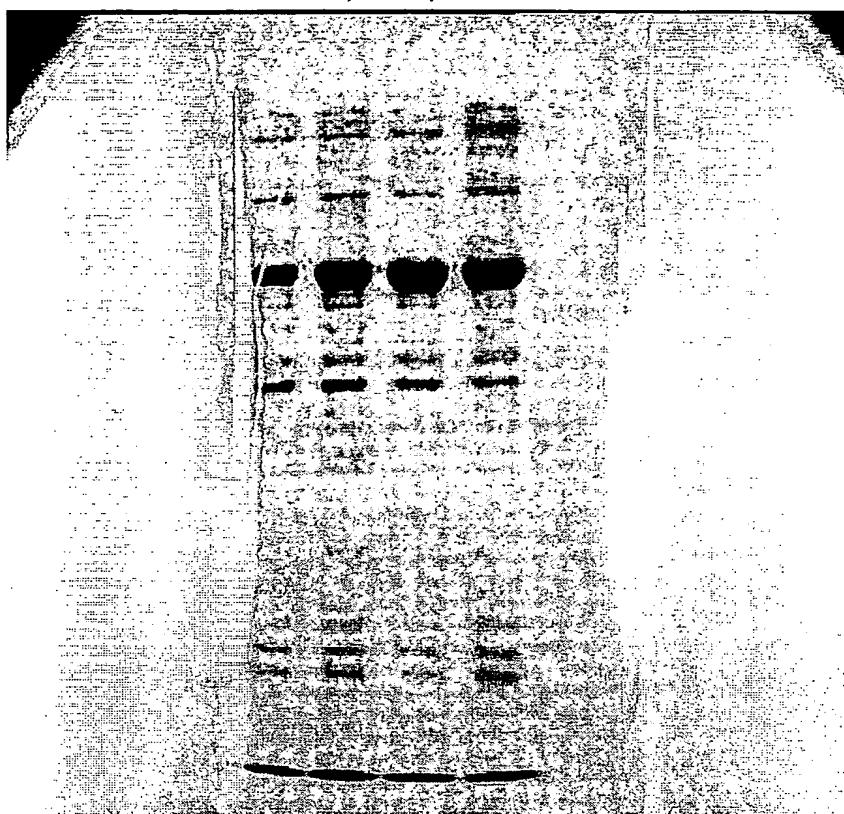
U.S. PATENT AND TRADEMARK OFFICE
Title: CLONING, OVEREXPRESSION AND
THERAPEUTIC USE OF BIOACTIVE
HISTIDINE AMMONIA LYASE
Inventor(s): Joseph ROBERTS et al.
DOCKET NO.: 078728/0106

JUN 03 2003
U.S. PATENT AND TRADEMARK OFFICE

Figure 5: SDS-PAGE showing expression of HAL in *E. coli*:

Lanes:

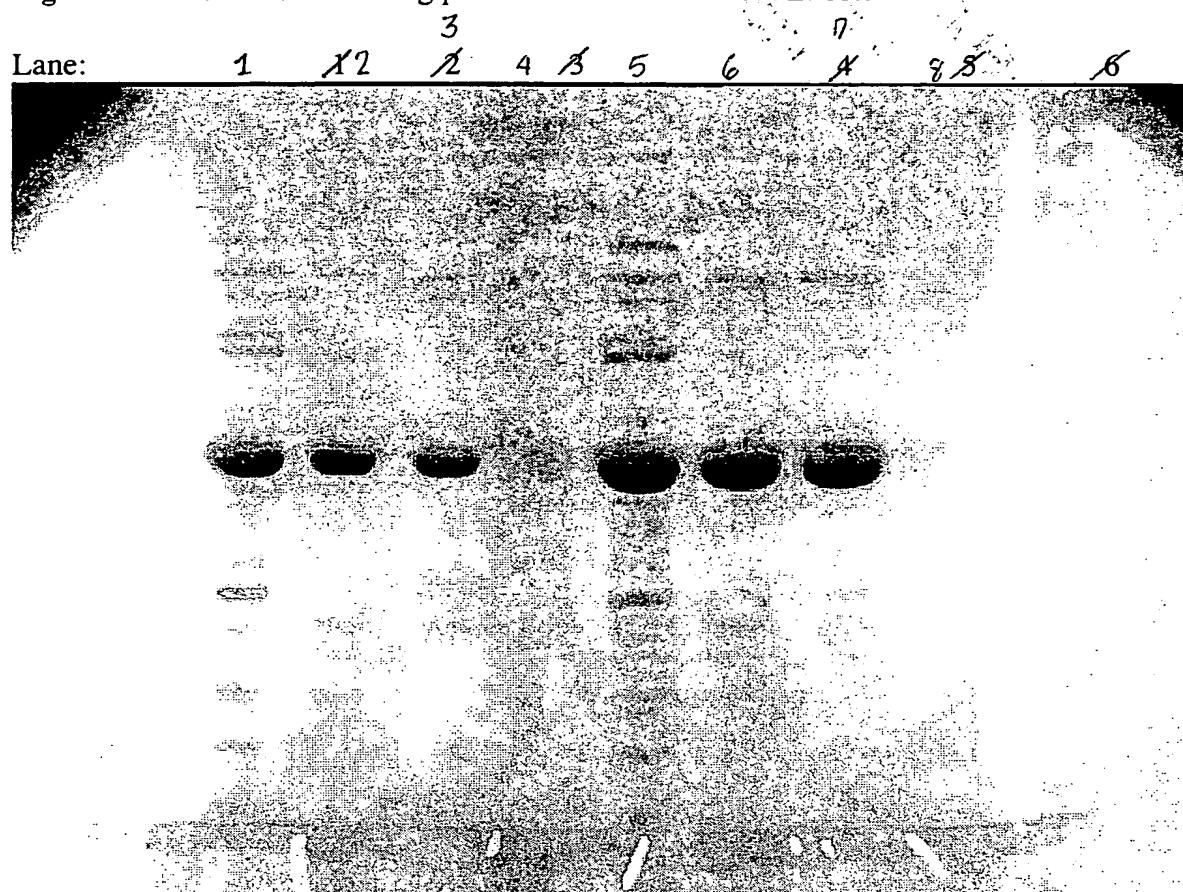
1 2X 3Z 4 β A



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Figure 6: SDS-PAGE showing purification of HAL from *E. coli*





A
Figure 13: Histidine ammonia lyase peptide sequence pileup

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HUTH_PSEPU -----
HUTH_RHIME -----
HUTH_MOUSE MPRYTVHVRGEWLAVPCQDGKLTGVWLGREAVRRYMKNKPNGGFTSVDEVQFLVHRCKG
HUTH_RAT MPRYTVHVRGEWLAVPCQDGKLSVGWLGREAVRRYMKNKPNGGFTSVDEVFLVRRCKG
HUTH_HUMAN MPRYTVHVRGEWLAVPCQDAQLTVGWLGREAVRRYIKNKPNGGFTSVDDAHFLVRRCKG
HUTH_CAEEL -MRLQVQIGTECVVVPCKP-DDTIHAVAKSVEKLRLRPK-----
LPLADDYFEVRRTVG
HUTH_BACS -----
HUTH_STRGR -----
HUTH_CORY -----
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HUTH_PSEPU -----
HUTH_RHIME -----
HUTH_MOUSE LGLLDNEDELEVALEDNEFVEVVIEGDVMS-----PDFIPSQPEGVFLYSKYR---
HUTH_RAT LGLLDNEDLLEVALEDNEFVEVVIEGDVMS-----PDFIPSQPEGVFLYSKYR---
HUTH_HUMAN LGLLDNEDRLEVALENNEFVEVVIEGDAMS-----PDFIPSQPEGVYLYSKYR---
HUTH_CAEEL NSLLDPEDLVSDVLKDSDFIIVAASVEETEADAKEAKKQEEIDNARAEIEKIDNRRRKVSF
HUTH_BACS -----
HUTH_STRGR -----
HUTH_CORY -----
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HUTH_PSEPU -----
HUTH_RHIME -----
HUTH_MOUSE EPEKYIALDGSLSSTEDLVNLGKGRYKIKLTSIAEKKVQQSREVIDSTIK
HUTH_RAT EPEKYIALDGSLSSTEDLVNLGKGRYKIKLTSIAEKKVQQSREVIDSIK
HUTH_HUMAN EPEKYIELDGDRLTTEDLVNLGKGRYKIKLPTAEKRVQKSREVIDSIK
HUTH_CAEEL ADSLAPMVLAPPTKLLILDGNSSLPEDLVRCEKGECAIQLSMESEDRIKARTFLEKIAS
HUTH_BACS -----
HUTH_STRGR MVTLDGSSLTTADVARVLFDFEEAAASEESMERVKKSRAAVERIVR
HUTH_CORY MDMHTVVVGSGTTAEDVVAVARHARVELSAAAVEALAAARLIVDALAA
HUTH_CORY -----
MASAPQITLGLSGATADDVIAVARHEARISISPQVLEELASVRAHIDALAS

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B
Figure 13 cont'd.

HUTH_PSEPU
EDRTAYGINTGFGLLASTRIASHDLENLQRSLVLSHAAGIGAPLDDDLVRLIMVLKINSL
HUTH_RHIME
GNAPVYGINCGFGKLASIKIDSSDVATLQRNLILSHCCGVGQPLTEDIVRLIMALKLISL
HUTH_MOUSE
ERTVVYGINCGFGKFARTVIPANKLQELQVNVLVRSHSSGVGKPLSPERCRMILLALRINV
HUTH_RAT
ERTVVYGINCGFGKFARTVIPANKLQELQVNVLVRSHSSGVGKPLSPERCRMILLALRINV
HUTH_HUMAN
EKTIVYGINCGFGKFARTVIPINKLQELQVNVLVRSHSSGVGKPLSPERCRMILLALRINV
HUTH_CAEEL
EHRAVYGVTTGFGTFSNVТИPPEKLKKLQLNLIRSHATGYGEPLAPNRARMLLALRINIL
HUTH_BACS
DEKTIYGINCGFGKFSDVLIQKEDSAALQLNLILSHACGVGDPFPECVSRAMLLRANAL
HUTH_STRGR
KPEPVYGVSTGFGALASRHIGTELRAQLQRNIVRSHAAGMGPRVEREVVRALMFLRLKTV
HUTH_CORY
ADTPVYGINCGFALATRHIAPEDRAKLQRSLIRSHAAGMGEPVEREVVRALMFLRAKTL

HUTH_PSEPU
SRGFSGIRRKVIDALIALVNAEVYPHIPLKGSGVGASGDLAPLATMSLVLLGEGKARYKGQ
HUTH_RHIME
GRGASGVRLELVRLLIEAMLDKGVIPLIPEKGSGVGASGDLAPLAHMAAVMMGHGEAFFAGE
HUTH_MOUSE
AKGYSGISLETLKQVIEAFNASCLS YVPEKGTVGASGDLAPLSHLALGLIGEGKMWSPKS
HUTH_RAT
AKGYSGISLETLKQVIEVFNASCLS YVPEKGTVGASGDLAPLSHLALGLIGEGKMWSPKS
HUTH_HUMAN
AKGYSGISLETLKQVIEMFNASCLPYVPEKGTVGASGDLAPLSHLALGLVGEKGKMWSPKS
HUTH_CAEEL
AKGHSGISVENIKKMAAFNAFCVS YVPPQQGTVGCGDLCPLAHLALGLLGEKGKMWSPTT
HUTH_BACS
LKGFSGVRAELIEQLLAFLNKRVHPVIPQQGSLGASGDLAPLSHLALALIGQGEVFFEGE
HUTH_STRGR
ASGHTGVRPEVAQTMADVLNAGITPVVHEYGSLGCGDLAPLSHCALTLMGEGEAEGPDG
HUTH_CORY ASGRS-
VRPVVLETMVGMNAGITPVVREYGSLGCGDLAPLSHCALVLMGEGEATDAHG

HUTH_PSEPU -
WLSATEALAVAGLEPLTLAAKEGLALLNGTQASTAYALRGLFYAEDLYAAAIACGGLSV
HUTH_RHIME -
RMKGDAALKAAAGLSPVTLAAKEGLALINGTQVSTALALAGLFRAHRAGQAALITGALST
HUTH_MOUSE
GWADAKYVLEAHGLKPIVLKPKEGLALINGTQMITSLGCEALERASAIARQADIVAALTL
HUTH_RAT
GWADAKYVLEAHGLKPIVLKPKEGLALINGTQMITSLGCEAVERASAIARQADIVAALTL
HUTH_HUMAN
GWADAKYVLEAHGLKPIVLKPKEGLALINGTQMITSLGCEAVERASAIARQADIVAALTL
HUTH_CAEEL
GWQPADVVLKKNNLEPLELGPKEGLALINGTQMVTLGAYTLERAHNIARQADVIAALSL
HUTH_BACS -
RMPAMTGLKKAGIQPVTLTSKEGLALINGTQAMTAMGVVAYIEAEKLAYQTERIASLTI
HUTH_STRGR
TVRPAGELLAAGGIAPVELREKEGLALLNGTDGMLGMLVMALADLRNLYTSADITAALSL
HUTH_CORY
DIRPVPPELFAEAGLTPVELAEKEGLALVNGTDGMLGQLIMALADLDELLDIADATAAMSV



Figure 13 cont'd.

HUTH_PSEPU	EAVLGSRSPFDARIHE-ARGQRGQIDTAACFRDLLGDSSEVSLSHKNCD----
KVQDPYS	
HUTH_RHIME	DAAMGSSAPFHPDIQH-CAAIRARSTRAAALRQLLTG-SPIRQSHIEGDE---
RVQDPYC	
HUTH_MOUSE	EVLKGTTKAFDTDIHA-VRPHRGQIEVAFRFRSLLDS-
DHHPSEIAESHRFCDRVQDAYT	
HUTH_RAT	EVLKGTTKAFDTDIHA-VRPHRGQIEVAFRFRSLLDS-
DHHPSEIAESHRFCDRVQDAYT	
HUTH_HUMAN	EVLKGTTKAFDTDIHA-LRPHRGQIEVAFRFRSLLDS-
DHHPSEIAESHRFCDRVQDAYT	
HUTH_CAEEL	DVLKGTRAYDPDIHR-IRPHRGQNL SALRLRALLHS-
EANPSQIAESHRNCTKVQDAYT	
HUTH_BACS	EGLQGIIDAFDEDIHL-ARGYQE QIDVAERIRFYLSD-SGLTTSQGE-----
LRVQDAYS	
HUTH_STRGR	EALLGTDKVLAPELHA-IRPHPGQGV SADNMSRVLAG-SGLTGHHQDDAP---
RVQDAYS	
HUTH_CORY	EAQLGTDQVFRAELHEPLRPHPGQGRSAQNMFAFLAD-SPIVASHREGDG---
RVQDAYS	

HUTH_PSEPU	
LRCPQVMGACLTQLRQAAEVLGIEANAVSDNPLVFAAEQDVISGGNFHAEPVAMAADNL	
HUTH_RHIME	IRCQPQVDGACLDLRLSVAATLTIEANAVTDNPLVLSDN-
SVVSGGNFHAEPVAFAAQDI	
HUTH_MOUSE	
LRCCPQVHGVVNDTIAFKDIITTELNSATDNPVFA SRGETISGGNFHGEYPAKALDYL	
HUTH_RAT	
LRCCPQVHGVVNDTIAFKDIITTELNSATDNPVFA SRGETISGGNFHGEYPAKALDYL	
HUTH_HUMAN	
LRCCPQVHGVVNDTIAFKNIITTELNSATDNPVFA SRGETVSGGNFHGEYPAKALDYL	
HUTH_CAEEL	
LRCPQVHGVVHDTIEFVREIITTEMNSATDNPVFA DREEIISGGNFHGEYPAKALDFL	
HUTH_BACS	
LCIPQVHGATWQTLGYVKEKLEIEMNAATDNP LIFNDGDKVISGGNFHGQPIAFAMDFL	
HUTH_STRGR	VRCAPQVNGAGRDTLDHAALVAGRELASSVDNPVVLPG-
RVESNGNFHGAPVAYVLDFL	
HUTH_CORY	LCSPQVTGAARDTIAHARLVATRELAAIDNPVVLPSG-
EVTSNGNFHGAPVAYVLDFL	

HUTH_PSEPU	ALAI AEGSLSERRISLMMDKHMS-
QLPPFLVENGGVNSGMIAQVTAALASENKALSH	
HUTH_RHIME	
ALAVCEIGAIQRRIALLVDPALSLRLPAFLAKPG LNSGLMIAEVTSALMSENKQLSH	
HUTH_MOUSE	AIGVHELAISERRIERLCNPSLS-
ELPAFLVAEGGLNSGMIAHCTAAALVSESKALCH	
HUTH_RAT	AIGVHELAISERRIERLCNPSLS-
ELPAFLVAEGGLNSGMIAHCTAAALVSESKALCH	
HUTH_HUMAN	AIGIHELAISERRIERLCNPSLS-
ELPAFLVAEGGLNSGMIAHCTAAALVSENKALCH	
HUTH_CAEEL	AIAVAELAQMSERRLERLVNKELS-
GLPTFLTPDGGLNSGMFTVQLCAASLVSENKVLCH	
HUTH_BACS	KIAISELANIAERRIERL VN PQLN-
DLPPFLSPHPGLQSGAMIMQYAAASLVSENKTLAH	
HUTH_STRGR	
AIVAADLGSICERRTDRLDKNRSHGLPPFLADDAGVDSGLMIAQYTQAA LVSEM KRLAV	
HUTH_CORY	
AI AVADLGSIAERRTDRMLD PARS RDLP AFLADD PGV DSGMMIAQYTQAGLVAENKRLAV	



D
Figure 13 cont'd.

HUTH_PSEPU	PHSVDSLPTSANQEDHVSMAAPAAGKRLWEMAENTRGVPAI E WLGACQGLDLRKG-LKTS
HUTH_RHIME	PASVDSTPTSANQEDHVSMACHGARRLLQMTENLFSIIGIEA L AAVQGIEFRAP-LTTS
HUTH_MOUSE	PSSVDSLSTSAAATEDHVS M GGWAARKALRVV E HVEQVLAIELL A ACQGIEFLRP-LKTT
HUTH_RAT	PSSVDSLSTSAAATEDHVS M GGWAARKALRVIEH V EQVLAIELL A ACQGIEFLRP-LKTT
HUTH_HUMAN	PSSVDSLSTSAAATEDHVS M GGWAARKALRVIEH V EQVLAIELLAA C QGIEFLRP-LKTT
HUTH_CAEEL	PSSVDSIPTSCNQEDHVS M GGFAARKALTVV E HVEA V LAMELLAACQGIEFLKP-LIST
HUTH_BACS	PASVDSIPSSANQEDHVS M GTIAARHAYQVIANTRRVIAIEAICALQAVEYRGI-EHAA
HUTH_STRGR	PASADSI P SSAMQEDHVS M WSAARKLRTAVDNLARIVAVELYAATRAIELRAAEGLTPA
HUTH_CORY	PA-VDSIPSSAMQEDHVS M LGWHAA K LPTSVANLRRILAVEMLIAGRALDLRAP-LKPG
 -	
HUTH_PSEPU	AKLEKARQALRSEVA-HYDRDRFFAPDIEKAVELLAKG---S-LTGLLPAGVLP S ---
 -	
HUTH_RHIME	PELQAAA A VRGVSS-SIEEDRYMADDLKAAGDLVASG---R-LAAAVSAGILPKLEN-
HUTH_MOUSE	TPLEK V YDLVRSVVR-
PWI K DRFMAPDIEAAHRL L DQKVWEVA A PYIEKYRMEHI P ESR	
HUTH_RAT	TPLEK V YDLVRSVVR-
PWI K DRFMAPDIEAAHRL L DQKVWEVA A PYIEKYRMEHI P ESR	
HUTH_HUMAN	TPLEK V YDLVRSVVR-
PWI K DRFMAPDIEAAHRL L EQKVWEVA A PYIEKYRMEHI P ESR	
HUTH_CAEEL	APLHKIYQLVRSVAP-
PLNEDRYMKPEIDAVLEMIRENRIWEAVLPHLETLEAMEELDPD	
HUTH_BACS	SYTKQLFQEMRKVVP-SIQQDRVFSYDIERLTDWLKK---ESLIPDHQNKE L RGMNI-
HUTH_STRGR	PASEAVVAALRAAGAEGPGPDRFLAPD L AAADTFVREG---R-LVAAVEPVTGPLA---
 -	
HUTH_CORY	PATGAVLEVRSKVA-GPGQDRFLSAELEAAYD L LANG---S-VHKALEAHLPE---
 -	
HUTH_PSEPU	-----
HUTH_RHIME	-----
HUTH_MOUSE	PLSPTAFSLES L RKNSATI P ESDDL---
HUTH_RAT	PLSPTAFSLES L RKNSATI P ESDDL---
HUTH_HUMAN	PLSPTAFSLQFLHKKSTK I P E SEDL---
HUTH_CAEEL	ALRQFTKTP T GIVQDRSMI P ISDDEESIE
HUTH_BACS	-----
HUTH_STRGR	-----
HUTH_CORY	-----

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80

1	983831	100.0%	MASAPQITLGLSGATADDVIAVARHEARISISPOVLEELASRAHIDALASADTPVYGI
2	SWALL: CAC21618	66.1%	-----MHTVVVGTSGVTAUSDVLAVARAGARIELSEEVAALAAARSUVDALAKPDPVYGVSTGFGALATRHSIPELRGRQLQ
3	SWALL: HUTH STRGR	65.4%	-----MDMHTVVVGTSGTTAEDVVARHARVELSAAVEALAAARLIVDALAAKPEPVYGVSTGFGALASRHIGTELRAQLQ
4	SWALL: HUTH DEIRA	46.8%	-----MILDRLDNLEQFISVVRHGEQVELSAAERERIARARTVIEQIVEGDTPIYGVNNTGFGKENVQIDRSQQLAQQLQ
5	SWALL: BAB16159	42.0%	-----VPLHHLADLYWNNGSAKLDPSSDAVLGAARIAEIAAGNAPVYGINNTGFGKLASKIKIDAIDLATLQ
6	SWALL: HUTH BACSU	40.4%	-----VPLHHLADLYWNNGSAKLDPSSDAVLGAARIAEIAAGNAPVYGINNTGFGKLASKIKIDAIDLATLQ
7	SWALL: Q9KSQ4	42.2%	-----MVTLDGSSLTTADVARYLFDEEAASESMMERVKKSRAAVERIVRDEKTIYGINNTGFGKFSDFVLQKEDSAAQLQ
8	SWALL: Q9HU85	41.7%	-----MLHLMIKPGQLSLKLQVSRSPVVLSDPEAIPAJAESQVQEVISEGRVYGINNTGFGLLANTKIAQDLETLQ
9	SWALL: Q9KBE4	39.3%	-----MSLHLKPGQLTLADLRQAYLAPVRSLDPSADAFAASVACVENILIAEGRRTAYGINNTGFGLLASTRISPADLEKLQ
10	SWALL: HUTH PSEPU	41.7%	-----MTNLKLLDGRSLSLHDHLRILYEGETVGASDEKTIYGINNTGFGKFSDFIDPDDVNLQ
11	SWALL: HUTH RHME	40.6%	-----TEITLKPGLTTLAQLRAHAPVRQLDASAAPADASVACVEQIIADERTAYGINNTGFGLLASTRASHDLENLQ
12	SWALL: Q9HU90	40.7%	-----LRPGSVPLSDELETTWTPGAPRLDAFDAGIAKAAARIAEIVAGNAPVYGINNTGFGKLASKIKIDSSDVATLQ
13	SWALL: HUTH HUMAN	39.2%	-----MSDLPSSVVFQGDLPLRQELVAVARHARGLSAAAWARIDNARAYCRIVANGERAYGISTGLGALCDVILLEQQLAELS
14	SWALL: HUTH CAEEL	38.8%	-----KREPEKYIILDGLTTEDVLNLGKGRYKIKLTPTAERKVQKSREVIDSIKEKTVVYGITGFGKFA-RTVTPANKIQLQ
15	SWALL: Q9HLI6	41.0%	-----VLAPPKLLILDGNSPEDLVRCGECAIQLSMESDRIRKARTFLEKIASEHRAVYGVTTGFGTFSNTVTPBKIKLQ
16	SWALL: HUTH MOUSE	38.6%	-----MIEIDGRSLRVEDYVAVAYEYDRVISISDDTLKAVEEKHAFKLINSGKTVYGVNTGFGSLLNNHIERDQEIELQ
17	SWALL: BAB29407	38.6%	-----KREPEKYIILDGDSTEDVLNLGKGRYKIKLTSIAEKVQQSREVIDSIKEKTVVYGITGFGKFA-RTVTPANKIQLQ
18	SWALL: HUTH RAT	38.2%	-----KREPEKYIILDGDSTEDVLNLGKGRYKIKLTSIAEKVQQSREVIDSIKEKTVVYGITGFGKFA-RTVTPANKIQLQ
19	SWALL: AAG53586	39.8%	-----MNALTLPGTLTLAQLRQWQOPLQLTDESAHEAINDSVACVEAIVAEGRRTAYGINNTGFGLLAQTRLATHDLENLQ
20	SWALL: Q9KKE0	38.9%	-----MGEMISLDGPLTWREIASIAEGASLDLSPARLRIAQARRTIVDALVERGIRGYGINNTGVGALCDVVISRENOQALS
21	SWALL: Q9HQDS	42.2%	-----MSDTRIDAADREALQ

Figure 14 A

Figure 14, cont'd.

		81	160
1 SWALL: CAC21618	100.0%	81	RSLIRSHAAGMGEPEVEREVRALMFLRAKTLASGRTGVRPVVLETMVGMLNAGITPVPVREYGSILGCGSDLAPLSHCAVL
2 SWALL: HUTH_STRGR	66.1%		RNIVRSHAAGMGPVEREVRALMFLRLKTVCSGRGTVRPEVQTMADVLNAGITPVPVHEYGSILGCGSDLAPLSHCACTL
3 SWALL: HUTH_DEIRA	65.4%		RNIVRSHAAGMGPVEREVRALMFLRLKTVASGHTGVRPEVQTMADVLNAGITPVPVHEYGSILGCGSDLAPLSHCACTL
4 SWALL: BAB16159	46.8%		HNLLIVSHAAGMGEPLPAEVVRGMLLRLRAQSLSLGHGSVREVEVLLNADALPVVPSQSGSVGASGDLAPLAHLALGL
5 SWALL: Q9KWE4	42.0%		RNLLLISHCCGVGAPLPENVRVLMALKLISLGRGASGVRIELIRLIEGMLEKGVIVP1PEKGSVGA
6 SWALL: HUTH_BACSU	40.4%		RNLLLISHCCGVGAPLPFPECVSRMLLRLRANALLKGFSGVRAELIEQLAFLNKRVHPV1PQGQSLIGASGDLAPLSHCAVL
7 SWALL: Q9KSQ4	42.2%		LNLLLISHACGVGDPFPECVSRMLLRLKTNSSLARGYSGIRLEQVIALIELVNNQIYPCVPKRGSGVGA
8 SWALL: Q9HU85	41.7%		KSTVLSHAAGGEIEMSDETRVLMMLKTNSSLARGESGIRRKVIDALIALINAEVYVPH1PLKGSVGA
9 SWALL: Q9KBE6	39.3%		RNLLLISHACGVGSPFPETVSRTMLVLRLIMVLKTNSSLRGFGFIRRKVIDALIALVNAEVYVPH1PLKGSVGA
10 SWALL: HUTH_PSEPU	41.7%		RNLLLISHACGVGQPLTEDIVRVLIMALKLISLGRGASGVRIELVRLTEAMLDKGV1P1PEKGSVGA
11 SWALL: HUTH_RHIME	40.6%		RNLLLISHACGVGQPLTEDIVRVLIMALKLISLGRGASGVRIELVRLTEAMLDKGV1P1PEKGSVGA
12 SWALL: Q9HU90	40.7%		RNTLISHACGVGEPRLDEQTRALICAAYANYSOCKSGLDRSLVEGLLLNHG1TQPQVPAQGSVGY--LTHMAHVGTIAL
13 SWALL: HUTH_HUMAN	39.2%		VNLVRSHSSGVGKPLSPERCMLLRLRINVLAKGSGISLETLKQVIEFNASCLPVPPEKGTVGASGDLAPLSHCAVL
14 SWALL: HUTH_CAEEL	38.8%		LNLLIRSHATGYGEPLAPNRAMLLRLRINVLAKGSGISLETLKQVIEFNACVSTVPOQGTVGCGSDLCPLAHLALGL
15 SWALL: Q9HLI6	41.0%		KNLJIRSHSSGVGDFYLENRYRATMAVRLNSLAAGYSAVSADLNNMMVEMLNRDVTPAVPKYGSVGA
16 SWALL: HUTH_MOUSE	38.6%		VNLVRSHSSGVGKPLSPERCMLLRLRINVLAKGSGISLETLKQVIEFNASCLSYVPEKGTVGASGDLAPLSHCAVL
17 SWALL: BAB29407	38.6%		VNLVRSHSSGVGKPLSPERCMLLRLRINVLAKGSGISLETLKQVIEFNASCLSYVPEKGTVGASGDLAPLSHCAVL
18 SWALL: HUTH_RAT	38.2%		VNLVRSHSSGVGKPLSPERCMLLRLRINVLAKGSGISLETLKQVIEFNASCLSYVPEKGTVGASGDLAPLSHCAVL
19 SWALL: AAG53586	39.8%		RSTVLSHAAGVGEPLDDIVRLMMLKTNSSLARGESGIRLSVIAQIALALVNAEVYVPH1PLKGSVGA
20 SWALL: Q9KKE0	38.9%		RNLLLISHACGVGDPGLGRVEARVMAAQIANLTHGSGVRVETAEMLLALLNADLITPL1PSRGSVGY----LTHAAVLV
21 SWALL: Q9HQDS	42.2%		ANLVRSHAAGGSELDTAAVRALLYRTRLNAALRGYSGIRERVLDVLVGLLNEGVHPVVESRGSLGASGDLAPLAHMSRVL

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Figure 14, *cont'd.*

		161	2
983831		100.0%	MGEGEATDAHGDIRPVPELFAEAGLTPVLAKEEGGLALYNGTDCGMLGOLIMALADLDELLIDIAADATAMSVEAQLGTDQV
1 SWALL: CAC2-1618		66.1%	MGEGDAEGPDGTVPAGELLAAHGIAPVELREKEGLALINGTDCGMLGMLVMAALDLDLTYKSADITTAALTMEALLGTDQV
2 SWALL: HUTH STRGR		65.4%	MGEGEAEGPDGTVPAGELLAAHGIAPVELREKEGLALINGTDCGMLGMLVMAALDLDLNRNLYTSADITTAALSLEALLGTDQV
3 SWALL: HUTH DEIRA		46.8%	IGLGDI-EYQQVORPAAVDLVAELGLSPVLOAKEGLALINGTOMGSSLALALHDAQVLGLTANIAAMTVEARYGSHRP
4 SWALL: BAB1-6159		42.0%	MGEGEAF-YQQVQNEPSKDALAKAGLSPVVLAAKEGLALINGTOTSTALALAGLFRAHRAAQSALVGTALSTDAAMGS SAP
5 SWALL: Q9KWE4		42.0%	MGEGEAF-YQQVQMPSKDALAKAGLSPVVLAAKEGLALINGTOTSTALALAGLFRAHRAAQSALVGTALSTDAAMGS SAP
6 SWALL: HUTH BACSU		40.4%	IGQEVF-FEGERNPAMTGLKKAGIQPTLTSKEGLALINGTOAMTAMGVVAYTEAEKLYOTERIASLTIEGLQIIDA
7 SWALL: Q9K5Q4		42.2%	LGEQOAR-YNGKLTISGLEAMKTAGLEPTILAKEGLALINGTOASTAFALEGFLVAEDLFASATVCGAMSVEAALGSRRP
8 SWALL: Q9HU85		41.7%	IGESRARH-RGEWILPAAEAALAVAGLEPLTLAAKEGLALINGTQVSTAYALRGLFEAEDLFAAATVCGGLSVEAMLGSRAP
9 SWALL: Q9KBE6		39.3%	LGEGEVF-YKGSTKTKASFALKKEEEIEPITLTAKELVAGLALINGTOAMTAMGVVAYTLAEAKLAFQSEIJIASLTMEGLRGIIDA
10 SWALL: HUTH PSEPU		41.7%	LGEKGKAR-YKGWNLISATEALAVAGLEPLTLAAKEGLALINGTOASTAFALEGFLYAEDLYAAATACGGLVEAVLGSRSP
11 SWALL: HUTH RHIME		40.6%	MGHGEAFFAGERMKGDAALKRA-AGLSPVTLLAAKEGLALINGTQVSTALALAGLFRAHRAQQAALITGALSTDAAMGS SAP
12 SWALL: Q9HU90		40.7%	LGIGEVS-YRGSVVPPAAAALAAEGLATVRLGAKDGLCLVNGTPCMTGLACLAQDDAORLQWADVIGAMSFEALRGQLOAA
13 SWALL: HUTH HUMAN		39.2%	VGEGKMWSPKGMDADKRYVLEAHGLKPVILPKPEGGLALINGTOMITSLGCEAVERASAIAQDIAVAAATLEVLKGTTKA
14 SWALL: HUTH CAEEL		38.8%	LGEKGKMWSPITGMQPADVVLKNNLEPLGPKEGLALINGTOMVTAALSLDVLKGTRAMGECKAF-FEGRAGDSARA
15 SWALL: Q9HLT6		41.0%	KEAGLKPYQFKEKEGGGLINGTSEMSGILSIAVMDAHDILENATRSALLSFEALGGTSKA
16 SWALL: HUTH MOUSE		38.6%	IGEKGKMWSPKGMDADKRYVLEAHGLKPVILPKPEGGLALINGTOMITSLGCEAVERASAIAQDIAVAAATLEVLKGTTKA
17 SWALL: BAB2-9407		38.6%	IGEKGKMWSPKGMDADKRYVLEAHGLKPVILPKPEGGLALINGTOMITSLGCEAVERASAIAQDIAVAAATLEVLKGTTKA
18 SWALL: HUTH RAT		38.2%	IGEKGKMWSPKGMDADKRYVLEAHGLKPVILPKPEGGLALINGTOMITSLGCEAVERASAIAQDIAVAAATLEVLKGTTKA
19 SWALL: RAG5-3586		39.8%	LGEKGKAR-YRGWILPAAATALQAGLAPVTLAAKEGGGLALINGTQVSTAFALRGLFEAEDLFASAVVCGALITTEAVLGSRRP
20 SWALL: Q9KKE0		38.9%	IGHGSAMOGTWRILSGADAL-ARLGLAPLRLLEAKEGLSLVNGTPCQATGLAALALARLTERLFWADAAAMTY-NLGSQAN
21 SWALL: Q9HQD5		42.2%	IGEQA-DVAGERMPAAEALAAADLEPTVLAKEGGGLALINGTQVAAALVDAEVLRSADTAGALITTEVTMSTAS

Title: CLONING, OVEREXPRESSION AND
THERAPEUTIC USE OF BIOAC
HISTIDINE AMMONIA LYASE
Inventor(s): Joseph ROBERTS et al.
DOCKET NO.: 078728/0106





Title: CLONING, OVEREXPRESSION AND THERAPEUTIC USE OF BIOACTIVE HISTIDINE AMMONIA LYASE
Inventor(s): Joseph ROBERTS et al.
DOCKET NO.: 078728/0106

Figure 14^D cont'd.

Figure 14₄ -cont'd.

		321	100.0%	321	100.0%
1	SWALL: CAC21618	66.1%	VVLPSEVTSNGNFHGAPPAYVLDFLIAVADLGSIAERRTDRLPARSRDLPFLADDPGVDSGMMIAQYTOAGLVAE	1	VVLPSEVTSNGNFHGAPPAYVLDFLIAVADLGSIAERRTDRLPARSRDLPFLADDPGVDSGMMIAQYTOAGLVAE
2	SWALL: HUTH STRGR	65.4%	VVLPDGRVEVSNGNFHGAPPAYVLDFLIAVADLGSIAERRTDRLDKNRSHGLPPFLADDAGVDSGLMIAQYTOAGLVGE	2	VVLPDGRVEVSNGNFHGAPPAYVLDFLIAVADLGSIAERRTDRLDKNRSHGLPPFLADDAGVDSGLMIAQYTOAGLVGE
3	SWALL: HUTH DEJRA	46.8%	LIFPTGEVVSNGNFHGQPLAVITDALKVAAELGSISERRTEOLINPALS-GLPAFLTPNGLNSGFMIAQYTSAAALVSE	3	LIFPTGEVVSNGNFHGQPLAVITDALKVAAELGSISERRTEOLINPALS-GLPAFLTPNGLNSGFMIAQYTSAAALVSE
4	SWALL: BAB1 ¹ 5159	42.0%	LVLSDNSVSVSGGNFHAEPAFAADQDTALAVCEIGAIAQRTIALVVDPALSYGLPAFLSKKPGLNGLSGLMIAEVTSAAALMSE	4	LVLSDNSVSVSGGNFHAEPAFAADQDTALAVCEIGAIAQRTIALVVDPALSYGLPAFLSKKPGLNGLSGLMIAEVTSAAALMSE
5	SWALL: Q9KWE4	42.0%	LVLSDNSVSVSGGNFHAEPAFAADQDTALAVCEIGAIAQRTIALVVDPALSYGLPAFLSKKPGLNGLSGLMIAEVTSAAALMSE	5	LVLSDNSVSVSGGNFHAEPAFAADQDTALAVCEIGAIAQRTIALVVDPALSYGLPAFLSKKPGLNGLSGLMIAEVTSAAALMSE
6	SWALL: HUTH BACSU	40.4%	LIFNDGDVISGGNFHGQPAFAMDFLKIAISELANIAERRTERLYNPNQLN-DLPPFLSPHPGLOSGAMINQYAAASLVSE	6	LIFNDGDVISGGNFHGQPAFAMDFLKIAISELANIAERRTERLYNPNQLN-DLPPFLSPHPGLOSGAMINQYAAASLVSE
7	SWALL: Q9KSQ4	42.2%	LVFADGDIISGGNFHAEPAAMAADNLALAAIEIGSLSERRISIMMDHMSQ-LPPFLVDNGGVNSGFMIAQVTAALASE	7	LVFADGDIISGGNFHAEPAAMAADNLALAAIEIGSLSERRISIMMDHMSQ-LPPFLVDNGGVNSGFMIAQVTAALASE
8	SWALL: Q9HU85	41.7%	LVFAAGDVISGGNFHAEPAAMAADNLALAAIEIGSLSERRISIMMDHMSQ-LPPFLVANGGVNSGFMIAQVTAALASD	8	LVFAAGDVISGGNFHAEPAAMAADNLALAAIEIGSLSERRISIMMDHMSQ-LPPFLVANGGVNSGFMIAQVTAALASD
9	SWALL: Q9KBE6	39.3%	LIFDNGQVISGGNFHGQOLALAMDFLGIAMAELANISERRTERLYNPNQLN-DLPPFLSAAPGVOSGMILLOYCAASLVSE	9	LIFDNGQVISGGNFHGQOLALAMDFLGIAMAELANISERRTERLYNPNQLN-DLPPFLSAAPGVOSGMILLOYCAASLVSE
10	SWALL: HUTH PSEPU	41.7%	LVFAAGDVISGGNFHAEPAAMAADNLALAAIEIGSLSERRISIMMDHMSQ-LPPFLVENGGVNSGFMIAQVTAALASE	10	LVFAAGDVISGGNFHAEPAAMAADNLALAAIEIGSLSERRISIMMDHMSQ-LPPFLVENGGVNSGFMIAQVTAALASE
11	SWALL: HUTH RHIME	40.6%	LVLSDNSVSVSGGNFHAEPAFAADQJIALAVCEIGAISQRTIALVVDPALSLRLPAFLAKKPGLNGLSGLMIAEVTSAAALMSE	11	LVLSDNSVSVSGGNFHAEPAFAADQJIALAVCEIGAISQRTIALVVDPALSLRLPAFLAKKPGLNGLSGLMIAEVTSAAALMSE
12	SWALL: Q9HU90	40.7%	LLLGTPPEVVSQANPHGEVSAMAADLLIAVAELGGVAERRLDRIVNPLVS-GLPAFLVGPKGPNNSGMMTOVVAASLAGE	12	LLLGTPPEVVSQANPHGEVSAMAADLLIAVAELGGVAERRLDRIVNPLVS-GLPAFLVGPKGPNNSGMMTOVVAASLAGE
13	SWALL: HUTH HUMAN	39.2%	MVFANGETVSGGNFHGEYFAKALDYLAIGIHELAASERRTERLYNPNPLS-ELPAFLVAEGGLNNSGFMIAHCTAAALVSE	13	MVFANGETVSGGNFHGEYFAKALDYLAIGIHELAASERRTERLYNPNPLS-ELPAFLVAEGGLNNSGFMIAHCTAAALVSE
14	SWALL: HUTH CAAEL	38.8%	LVFADREIIISGGNFHGEYFAKALDFLIAVAELAQMSERRTERLYNPNPLS-GLPTFLTPDGGLNSGFMIVQLCAAASLVSE	14	LVFADREIIISGGNFHGEYFAKALDFLIAVAELAQMSERRTERLYNPNPLS-GLPTFLTPDGGLNSGFMIVQLCAAASLVSE
15	SWALL: Q9HLI6	41.0%	L-FNGEEVVSGGNFHGEYFAKALDFLIAVTDLGNMVERRIALVDTNLS-GLPPFLTPDGLNSGFMIVQYTAALCNR	15	L-FNGEEVVSGGNFHGEYFAKALDFLIAVTDLGNMVERRIALVDTNLS-GLPPFLTPDGLNSGFMIVQYTAALCNR
16	SWALL: HUTH MOUSE	38.6%	MVFASGETISGGNFHGEYFAKALDYLAIGVHELAASERRTERLYNPNPLS-ELPAFLVAEGGLNNSGFMIAHCTAAALVSE	16	MVFASGETISGGNFHGEYFAKALDYLAIGVHELAASERRTERLYNPNPLS-ELPAFLVAEGGLNNSGFMIAHCTAAALVSE
17	SWALL: BAB2 ¹ 407	38.6%	MVFASGETISGGNFHGEYFAKALDYLAIGVHELAASERRTERLYNPNPLS-ELPAFLVAEGGLNNSGFMIAHCTAAALVSE	17	MVFASGETISGGNFHGEYFAKALDYLAIGVHELAASERRTERLYNPNPLS-ELPAFLVAEGGLNNSGFMIAHCTAAALVSE
18	SWALL: HUTH RAT	38.2%	MVFASGETISGGNFHGEYFAKALDYLAIGVHELAASERRTERLYNPNPLS-ELPAFLVAEGGLNNSGFMIAHCTAAALVSE	18	MVFASGETISGGNFHGEYFAKALDYLAIGVHELAASERRTERLYNPNPLS-ELPAFLVAEGGLNNSGFMIAHCTAAALVSE
19	SWALL: AAG5 ¹ 586	39.8%	LVFAANEMVERGNFHAEPAAMAADNLALAAIEIGALSERRIALMDKHMSQ-LPPFLVRNNGGVNSGFMIAQVTAALASE	19	LVFAANEMVERGNFHAEPAAMAADNLALAAIEIGALSERRIALMDKHMSQ-LPPFLVRNNGGVNSGFMIAQVTAALASE
20	SWALL: Q9KRE0	38.9%	AVGSPEVHSQAHAVGAIGLAMDSLAVAVAEEAISERRTERLYNPNPLVS-GLPAFLAGDSGVSSGFMIAQYTAALVAE	20	AVGSPEVHSQAHAVGAIGLAMDSLAVAVAEEAISERRTERLYNPNPLVS-GLPAFLAGDSGVSSGFMIAQYTAALVAE
21	SWALL: Q9HQDS	42.2%	LVPSGTVVSGGNFHGEVIALRLGYAASALAEELAISERRTERLYNPNPLVS-GLPAFLAGDSGVSSGFMIAQYTAASLVND	21	LVPSGTVVSGGNFHGEVIALRLGYAASALAEELAISERRTERLYNPNPLVS-GLPAFLAGDSGVSSGFMIAQYTAASLVND

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Inventor(s): Joseph ROBERTS et al.
DOCKET NO.: 078728/0106

A circular stamp with the words "PATENTS & TRADEMARK OFFICE" curved along the top and bottom edges. In the center, it says "JUN 03 2003".

84

401		983831	100.0%
1	SWALL: CAC21618	66.1%	LKRLA V P A S V D S I P S S A M Q E D H V S M G W H A A R K L R T S V A N R R I L A V E M I A G R A L D L R A P L K P G P A T G A V L E V L R S K V A G
2	SWALL: HUTH_STRGR	65.4%	MKRLA V P A S V D S I P S S A M Q E D H V S M G W H A A R K L R T S V A N R R I L A V E M I A G R A L D L R A P L K P G P A T G A V L E V L R S K V A G
3	SWALL: HUTH_DEIRA	66.8%	NKVL S H P A S V D S I P S S A M Q E D H V S M G W H A A R K L R T S V A N R R I L A V E M I A G R A L D L R A P L K P G P A T G A V L E V L R S K V A G
4	SWALL: BAB1_6159	42.0%	NKQM S H P A S V D S I P S S A M Q E D H V S M G W H A A R K L R T S V A N R R I L A V E M I A G R A L D L R A P L K P G P A T G A V L E V L R S K V A G
5	SWALL: Q9KWE4	42.0%	NKQM S H P A S V D S I P S S A M Q E D H V S M G W H A A R K L R T S V A N R R I L A V E M I A G R A L D L R A P L K P G P A T G A V L E V L R S K V A G
6	SWALL: HUTH_BACSU	40.4%	NKTLA H P A S V D S I P S S A M Q E D H V S M G W H A A R K L R T S V A N R R I L A V E M I A G R A L D L R A P L K P G P A T G A V L E V L R S K V A G
7	SWALL: Q9KSQ4	42.2%	NKTLA H P A S V D S I P S S A M Q E D H V S M G W H A A R K L R T S V A N R R I L A V E M I A G R A L D L R A P L K P G P A T G A V L E V L R S K V A G
8	SWALL: Q9HU85	41.7%	NKALAH P A S V D S I P S S A M Q E D H V S M G W H A A R K L R T S V A N R R I L A V E M I A G R A L D L R A P L K P G P A T G A V L E V L R S K V A G
9	SWALL: Q9KBE6	39.3%	NKTLA H P A S V D S I P S S A M Q E D H V S M G W H A A R K L R T S V A N R R I L A V E M I A G R A L D L R A P L K P G P A T G A V L E V L R S K V A G
10	SWALL: HUTH_PSEPU	41.7%	NKALSH P H S V D S I P S S A M Q E D H V S M G W H A A R K L R T S V A N R R I L A V E M I A G R A L D L R A P L K P G P A T G A V L E V L R S K V A G
11	SWALL: HUTH_RHIME	40.6%	NKOL S H P A S V D S I P S S A M Q E D H V S M G W H A A R K L R T S V A N R R I L A V E M I A G R A L D L R A P L K P G P A T G A V L E V L R S K V A G
12	SWALL: Q9HU90	40.7%	NROLA Q P A V D V D F V T S A L Q E D H L S L G T S A A K L G R A L N R I L A V E M I A G R A L D L R A P L K P G P A T G A V L E V L R S K V A G
13	SWALL: HUTH_HUMAN	39.2%	NKALCH P S S V D S I P S S A M Q E D H V S M G W H A A R K L R T S V A N R R I L A V E M I A G R A L D L R A P L K P G P A T G A V L E V L R S K V A G
14	SWALL: HUTH_CAEEL	38.8%	NKVLCH P S S V D S I P S S A M Q E D H V S M G W H A A R K L R T S V A N R R I L A V E M I A G R A L D L R A P L K P G P A T G A V L E V L R S K V A G
15	SWALL: Q9HLL6	41.0%	NKVLAY S S A D T I P T S A A T E D H V S M G W H A A R K L R T S V A N R R I L A V E M I A G R A L D L R A P L K P G P A T G A V L E V L R S K V A G
16	SWALL: HUTH_MOUSE	38.6%	SKALCH P S S V D S I P S S A M Q E D H V S M G W H A A R K L R T S V A N R R I L A V E M I A G R A L D L R A P L K P G P A T G A V L E V L R S K V A G
17	SWALL: BAB2_9407	38.6%	SKALCH P S S V D S I P S S A M Q E D H V S M G W H A A R K L R T S V A N R R I L A V E M I A G R A L D L R A P L K P G P A T G A V L E V L R S K V A G
18	SWALL: HUTH_RAT	38.2%	SKALCH P S S V D S I P S S A M Q E D H V S M G W H A A R K L R T S V A N R R I L A V E M I A G R A L D L R A P L K P G P A T G A V L E V L R S K V A G
19	SWALL: AAG5_3586	39.8%	NKGLCH P T S V D F P S A N Q E D H V S M G W H A A R K L R T S V A N R R I L A V E M I A G R A L D L R A P L K P G P A T G A V L E V L R S K V A G
20	SWALL: Q9KKEO	38.9%	NRLLA P A S L D G G T S V D F P S A N Q E D H V S M G W H A A R K L R T S V A N R R I L A V E M I A G R A L D L R A P L K P G P A T G A V L E V L R S K V A G
21	SWALL: Q9H0D5	42.2%	LPSL G P - T L D N A S V S G A Q E D H V S M G W H A A R K L R T S V A N R R I L A V E M I A G R A L D L R A P L K P G P A T G A V L E V L R S K V A G

Figure 14 *continued.*

Figure 14 *e cont'd.*

		481	5	513
983831		100.0%	[PGQDRFLSAELEYAAYDILLANGSVHKALEAHHLPA
1 SWALL: CAC21618		66.1%	PGPDRHLAPDIAADAFAVRAGHLVAAAESVTGP	
2 SWALL: HUTH_STRGR		65.4%	PGPDRFLAPDIAADTFVREGRIVAAVEPVVTGP	
3 SWALL: HUTH_DEIRA		46.8%	LTEDRYFRPDLIRGELVSGRVAQAADTQAPA	
4 SWALL: BAB1_6159		42.0%	LEDDRYMATDIKAAIEVVAAGLVSAISSGLPV	
5 SWALL: Q9KWE4		42.0%	LEDDRYMATDIKAAIEVVAAGLVSAISSGLPV	
6 SWALL: HUTH_BACSU		40.4%	IQODRVRFSYIILERLTDWLKESLIPDHQNKELR	
7 SWALL: Q9KSQ4		42.2%	YDKDRYFAPDEKANALL-QLAVHNRIMPQDQLL	
8 SWALL: Q9HU85		41.7%	YQEDRFFAPDIEAASQLLASGCCNALLPARIILP	
9 SWALL: Q9KBE6		39.3%	IDQDRMFAKDIERAAKWLKGDSWDFTKMREKER	
10 SWALL: HUTH_PSEPU		41.7%	YDRDRFFAPDIEKAVELLAGKGSLTGLLPGAGLPS	
11 SWALL: HUTH_RHIME		40.6%	IEEDRYMADDIKAAAGDVLVASGRLLAAAVSAGLK	
12 SWALL: Q9HU90		40.7%	YDTPRMLAPDIAAAAIIIGERKSLARLAASIGD	
13 SWALL: HUTH_HUMAN		39.2%	WIKDRMAPDIEAAHRLLEQKQWEEVAAPIEK	
14 SWALL: HUTH_CAEEL		38.8%	PNEDRYMKPEIDAVLEMIRENRWEAVLPHLET	
15 SWALL: Q9HLI6		41.0%	LDHDRRPSDEIETIRKMMDKKEFISALP-----	
16 SWALL: HUTH_MOUSE		38.6%	WIKDRMAPDIEAHRLLLDQKVWEVAAPIEK	
17 SWALL: BAB29407		38.6%	WIKDRMAPDIEAHRLLLDQKVWEVAAPIEK	
18 SWALL: HUTH_RAT		38.2%	WIKDRMAPDIEAHRLLLDQKVWEVAAPIEK	
19 SWALL: AG53586		39.8%	YDDDRFFAPDIEAISLINKSIVGLLPAFL-----	
20 SWALL: Q9KKE0		38.9%	PIATIVR-----	
21 SWALL: Q9HQDS		42.2%	PAGDRALADDMAAVGDLVRAGLVEDAVARALDA	

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JUN 03 2003

Figure 14, cont'd.

KEY:

983831 : HAL
1 CAC21618 : Streptomyces coelicolor
2 HUTH_STRGR : Streptomyces griseus
3 HUTH_DEIRA : Deinococcus radiodurans
4 BAB16159 : Agrobacterium rhizogenes
5 Q9KWE4 : Agrobacterium rhizogenes
6 HUTH_BACSU : Bacillus subtilis
7 Q9KSQ4 : Vibrio cholerae
8 Q9HU85 : Pseudomonas aeruginosa
9 Q9KBE6 : Bacillus halodurans
10 HUTH_PSEPU : Pseudomonas putida
11 HUTH_RHIME : Rhizobium meliloti
12 Q9HU90 : Pseudomonas aeruginosa
13 HUTH_HUMAN : Human
14 HUTH_CAEEL : Caenorhabditis elegans
15 Q9HLI6 : Thermoplasma acidophilum
16 HUTH_MOUSE : Mouse
17 BAB29407 : Mus musculus (Mouse)
18 HUTH_RAT : Rat
18 AAG53586 : uncultured bacterium pCosAS1
20 Q9KKE0 : Rhizobium meliloti
21 Q9HQD5 : Halobacterium sp

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HISTIDINE AMMONIA LYASE

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Figure 15A.

STRG "HAL"	6	VVVGTSGGTTAEDVVAVARH GARVELSAAAVEALAAARLIVDALAAKPEPVYGVSTGFGAL	*****
	7	ITLGLSGATAADDVIAVARHEARI SIS P QVLEELASVRAHIDALASADTPVYGIS TGF GAL	*****
STRG, HAL	66	ASRHIGTELRAQLQRNIVRSHAAGMGPVEREVVRALMFIRLKTVASGHTGVRPEVAQTM	*****
	67	ATRHIAPEDRAKLQRSLIRSHAAGMGPVEREVVRALMFIRAKTLASGRTGVRPVVLETM	*****
	*	*****	*****
STRG HAL	126	ADVLNAGITPVVHEYGSLGCSGDLAPLSHCALTMGEGEAEGPDGTVRPAGELLAAHGIA	*****
	127	VGMLNAGITPVVREYGSLGCSGDLAPLSHCALVLMGEGEATDAHDIRPVPELFAEAGLT	*****
	*	*****	*****
STRG HAL	186	PVELREKEGLALLNGTDGMLVMA LADLRLNLYTSADITAALSLEALLGTDKVLAPELH	*****
	187	PVELAEKEGLALVNGTDGMLQOLIMALADLDELLDIADAT AAMSVEAQLGTDQVFR AELH	*****
	*	*****	*****
STRG HAL	246	A-IRPHPGQQGVSADNMSRVLAGSGLTGHQDDA P R V Q D A Y S V V R C A P Q V N G A G R D T L D H A A	*****
	247	EPLRPHPGQGRSAQNMFAFLADSPIVASHREGDGRVQDAYSLRCSPQVTGAARDTIAHAR	*****
	*	*****	*****
STRG HAL	305	LVAGRELA S V D N P V V L P D G R V E S N G N F H G A P V A Y V I D F L A I V A A D L G S I C E R R T D R L L D	*****
	307	LVATRELA A A I D N P V V L P S G E V T S N G N F H G A P V A Y V I D F L A I A V A D L G S I A E R R T D R M L D	*****
	*	*****	*****

A circular stamp with the words "ENT & TRADE MARK REG'D" around the perimeter and "JUN 03 2003" in the center.

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OIP

Figure 15. β -Centauri.